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Dr. Joshua Lederberg
Department of Genetics
Stanford University School of Medicine
Palo Alto, California 94304

Dear Josh:

Thanks for the items you sent with your note of a few days ago. Dr. Seaborg has been very much intrigued by your estimation of mutational load costs as related to radiation exposures and has had Charlie Edington and Dean Parker help him with the background.

I think it might be good to have your viewpoint carefully set forth in B.A.S. My regret is that they did not have the editorial good sense to try something like that first instead of uncritically printing the Sternglass claims. They laid themselves open to the charge that they too are interested only in the sensational. The attempt to present both sides of the question came only after the damage had been irreparably done.

One thing troubles me about what I have seen so far of your estimates. Perhaps we are responsible for that since we have stressed the 170 mrem limit. In fact, it is not the only limit and it is not the most restrictive one which is in force with respect to civilian nuclear power reactors.

Probably the most restrictive regulation is the 0.5r exposure limit at the power plant boundary. Referring to gaseous effluent Knox (UCRL 72765 - copy enclosed) has estimated that for the population in a radius of 100 km around a plant to receive an annual average of 170 mr the exposure rate at the boundary of the plant must be 100 rads yearly. Since the 170 mrem standard was derived from the 5r and 0.5r limits (applied to successively larger populations at risk) lowering it 10 fold should result in a correspondingly lowered boundary exposure limit. It is this restriction which would probably put some forms of nuclear power in jeopardy.

You might ask why it is necessary to lower both limits but I think the last sentence in section 1) of your letter to Miss Tocknell has the answer to that already implied.

In your section 2) of the Tocknell letter you refer to the possibility of ecosystem concentration resulting in an unforeseen upset of some sort. I think you underestimate as have many others what has been done in the line of research and documentation on this subject. The ecological "concentration" of a radioisotope of an element is limited by its specific activity which must be diminished continually in relation to its distance from its source as it mixes with other sources of the same element.

It is only in special circumstances such as in the Columbia River that very high ratios of reconcentration can occur. There is an enormous amount of data on specific activities of many dozens of nuclides in biological material including all of those that are likely to be of consequence in plants and animals. The only situations that come to mind that have presented embarrassingly high concentrations are the combination in which there is little or no supply of the element in the supporting medium or when the food chain is very short. Five of these are very well known: Iodine to grass → cow → human; strontium to grain → cow → human; cesium to lichen → caribou → human; phosphate to Columbia River → algae → duck, iron to water → algae → zooplankton → small fish → salmon. All but one of these have only two or at most three links since neither iodine nor cesium is incorporated into the plant. Strontium is a problem chiefly while it is still on vegetation from recent fallout. None of these elements present any especially difficult problem for nuclear power plants.

I suppose my chief worry is that you may be led to discuss a hypothetical situation in which a large population is supposed to be exposed to the full limit of a standard. In fact the regulations as now applied would never permit that level to rise to more than a percent or less of the limit. Probably the reason standards are being attacked is that those who first attacked them were not acquainted with the manner of their application and have avoided a candid and unbiased look at what the real situation is. They have created a fight which bystanders are dragged into often without knowing what the fight is all about either. It is true that there might be exigencies that would tempt people to push for greater exposures but that is a problem for the generation that it confronts. It is very unlikely to confront ours since it is difficult to conceive a situation in which the workers at a plant would subject themselves to near lethal doses.

The real question that might be debated is to my mind, "given the radiation standards as promulgated what has been the record of the AEC - which is charged with enforcing the regulations derived from the standards - in protecting the public against excessive exposure from civilian nuclear power plant derived radiation sources. Will these regulations be sufficient to protect the public in the future?"

I have dwelt at length on some of the problems associated with attempting to present a reasonably clear picture to readers of B.A.S. I am not sure my colleagues would agree with my thoughts and the letter should not be regarded as "official AEC policy." I do appreciate your invitation to comment.

Sincerely,

John

John R. Totter, Director
Division of Biology and Medicine

Enclosure:
UCRL - 72765